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U. S. Medical Field Service School,
Carlisle Barracks, Pa.
Wakeman Field

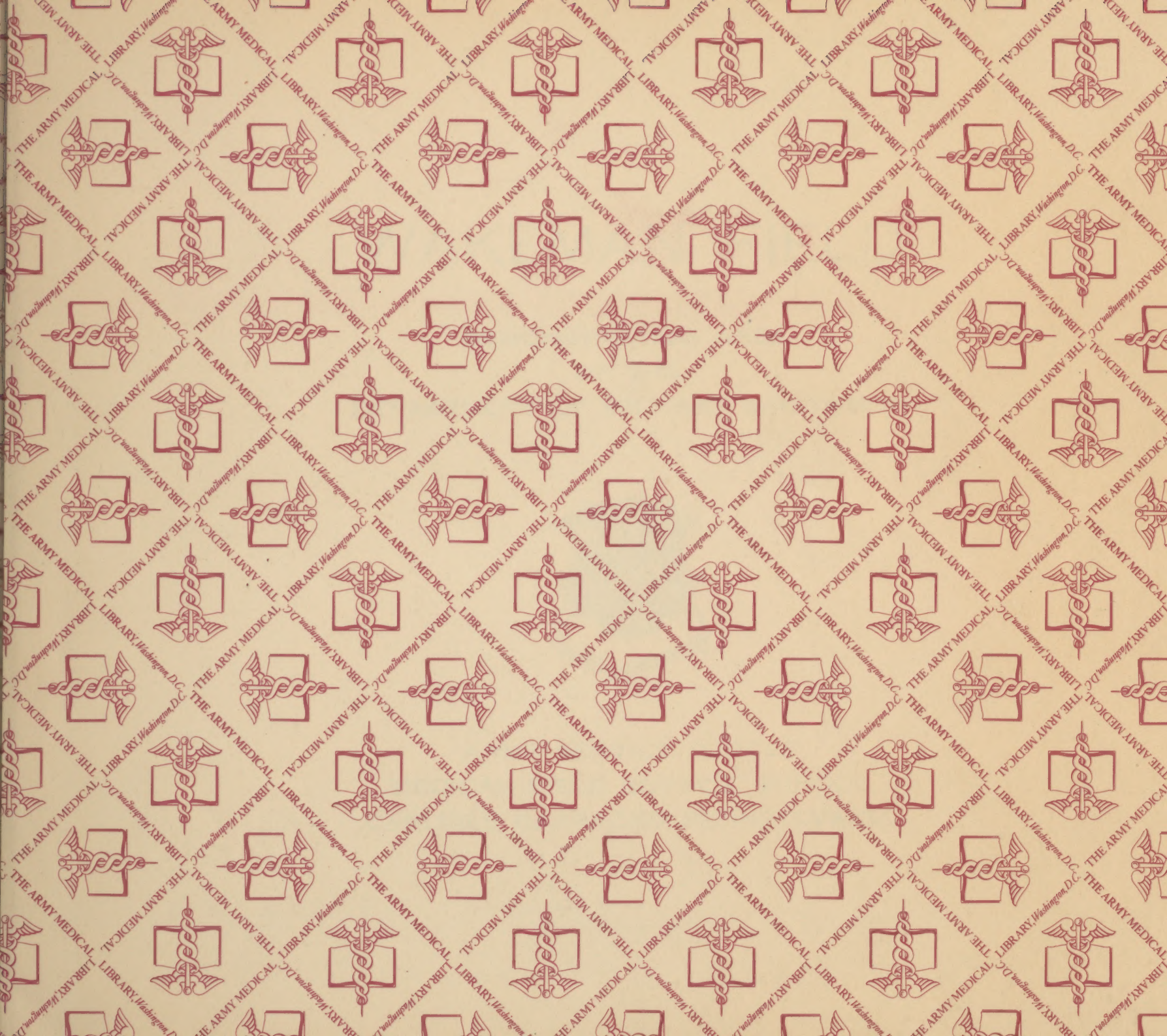
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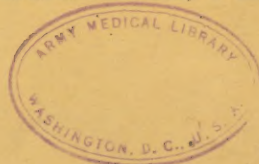


WAKEMAN FIELD

DEMONSTRATION AREA
OF THE
DEPARTMENT OF MILITARY SANITATION



ARMY SERVICE FORCES
MEDICAL FIELD SERVICE SCHOOL
CARLISLE BARRACKS, PENNSYLVANIA

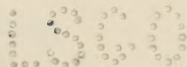


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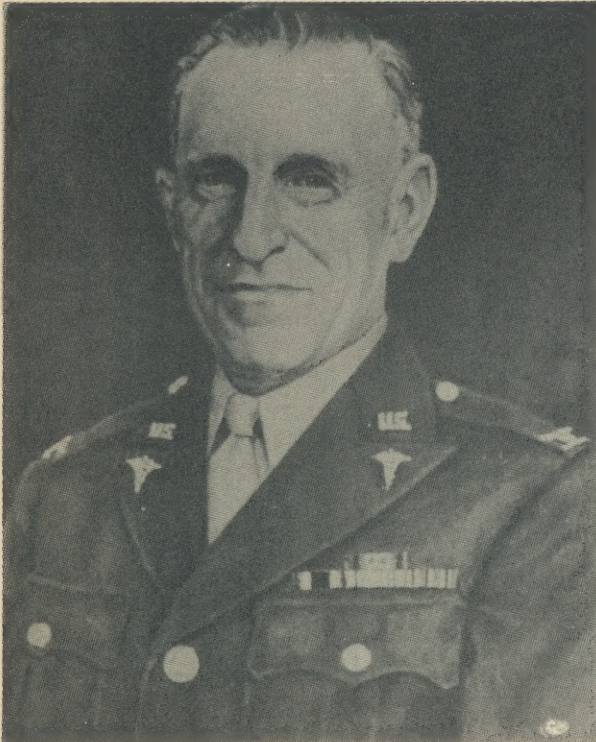
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An oil painting at the entrance of Wakeman Field shows how the 8½ acres are divided. Proceeding from right to left, the first four sections have devices related to mess sanitation and kitchen waste disposal, and the second four sections have devices for the disposal of human wastes. In the large section are devices for personal hygiene, delousing, water procurement and treatment, and mosquito control. The next section shows how animal wastes and carcasses may be disposed of, and the triangular area at the end is used for applicatory exercises on unit water problems. These sections are shown on the following pages:

	Pages
Mess Sanitation	6-27
Human Wastes	28-36
Animal Wastes	37-40
Personal Hygiene	41-44
Water Supply	45-49
Insect and Rodent Control	50-56



Wakeman Field is named after Colonel Frank B. Wakeman, Medical Corps, who was Director of the Training Division of the Surgeon General's Office when he met his untimely death on 17 March 1944. Colonel Wakeman served in the Department of Military Sanitation at Carlisle Barracks from July 1937 to September 1939.

HISTORY

The Department of Military Sanitation of the Medical Field Service School at Carlisle Barracks always has used visual demonstrations and applicatory exercises in teaching military preventive medicine. In 1934 a small permanent outdoor demonstration area was set aside for the Department and some of the more representative types of sanitary devices were constructed. In 1941 larger classes and the diversity of sanitary problems created by a global war rendered the old area inadequate. Additional land acquired in 1943 made possible the development of Wakeman Field.



On 11 October 1944 Brigadier General Addison D. Davis, commandant of the Medical Field Service School, formally dedicated Wakeman Field. Major General Russel B. Reynolds gave the principal address. Thus, an area became available in which it is possible to conduct simultaneous demonstrations for three classes of 250 men each. In some demonstrations and applicatory exercises, such as that dealing with mess sanitation, the class is subdivided into four sections which are then rotated among four instructors.



Wakeman Field has been visited by many distinguished guests. For instance, on 2 June 1945 General Gustavo Cordeiro de Farias and Captain Jodofrido de Rocky of the Brazilian Army inspected the area. Even the solitary visitor may learn considerable by studying the installations in Wakeman Field, since each is carefully labeled and supplemented by oil paintings and diagrams to explain the details of construction and operation. All the sanitary facilities are full size working models. They are not only operated during class exercises; but they are also given trials, torn apart, reconstructed, compared, and developed. Thus, Wakeman Field is an experimental laboratory as well as an outdoor textbook of environmental sanitation.



Wakeman Field was envisioned by Colonel Marcus D. Kogel, M.C., who was director of the Department of Military Sanitation from December 1941 to March 1945.

Department of Military Sanitation personnel, September, 1945. Left to right, front row: Capt. Adolph D. Casciano, Maj. Leslie E. West, Maj. Franklin M. Foote (acting director), Maj. Mortimer A. Benioff, Capt. Edwin Matlin. Second row: Capt. William M. Webb, Lt. John S. Shrader, Capt. Osmond P. Breland, Capt. Walter L. Griffith, and Capt. William W. Stiles.

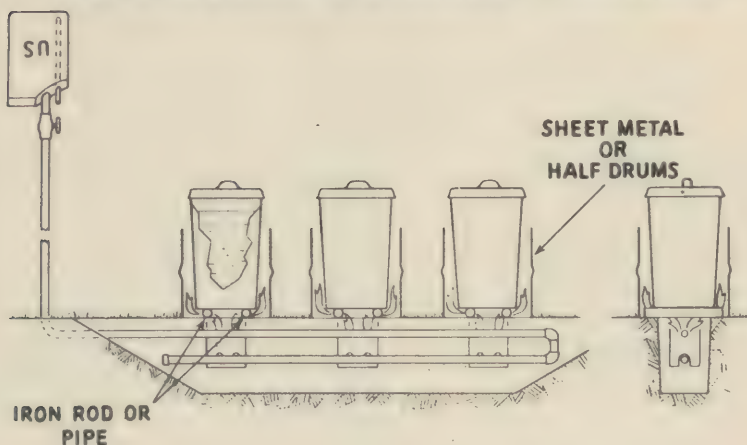


MESS SANITATION



Outdoor instruction in mess sanitation includes the demonstration of a company field mess set up by personnel from the 32nd Medical Battalion. The unit consists of a kitchen tent, gasoline cooking stoves complete with utensils, corrugated cans with immersion type burners for mess-kit washing, garbage pit, handwashing device and Lyster bag. The instructor discusses mess inspection, storage and preparation of food, physical examination of food handlers, and the proper care of mess gear.

IMPROVISED GASOLINE BURNERS



The reservoir of gasoline, shown at the left of the diagram, is elevated at least 6 feet above the ground in order to provide sufficient pressure. Liquid gasoline flowing through the upper horizontal pipe is heated by the flames and converted into gasoline vapor. Thence the vapors course through the lower horizontal pipe and escape through tiny holes in the upper surface. Air is drawn into the stream of gasoline vapor as it emerges from the orifice, and here the mixture is ignited.

In this instance the burner is being used to heat water for mess-kit washing. By a combination of the right pressure behind the gasoline column and the appropriate size of orifice, the most effective mixture of gasoline vapor and air may be obtained. Shields around the cans greatly increase the efficiency.



The conventional way of heating water in a G.I. can is to merely place it over a fire in a trench, as shown in Fig. 1. Thus, only a part of the bottom of the can is exposed to the flame, and a large proportion of the surface of the can is left to radiate heat to the surrounding air.

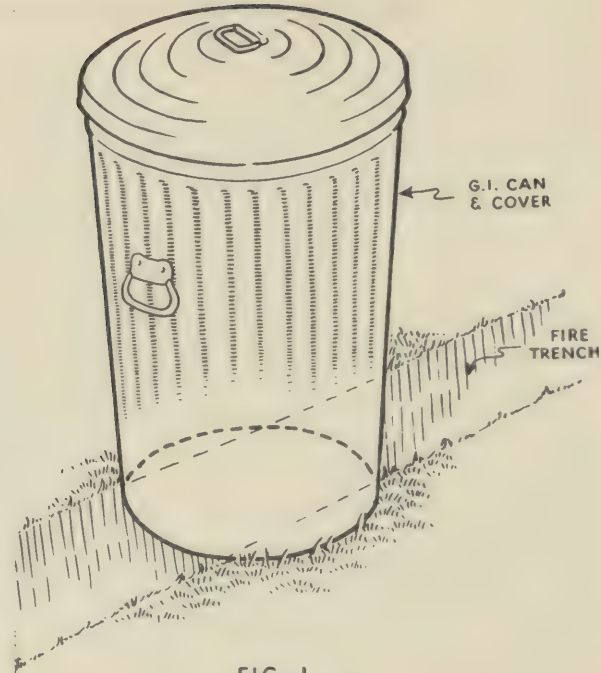


FIG. 1
FORMER METHOD

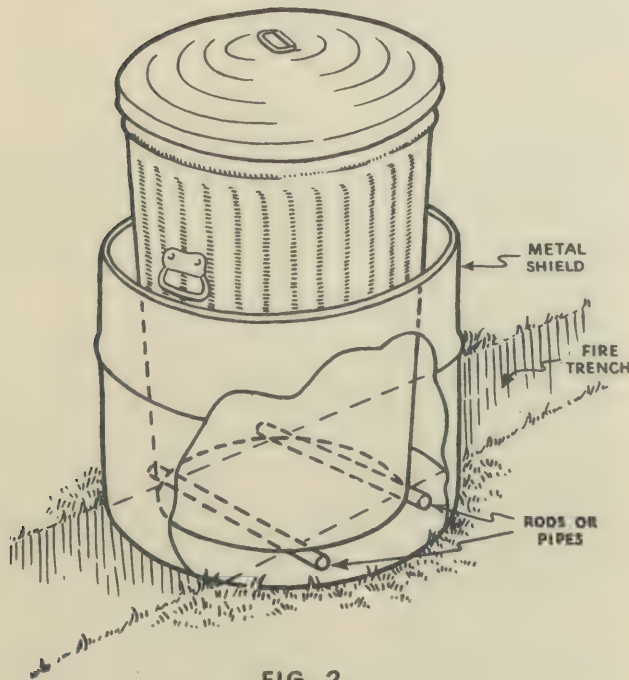
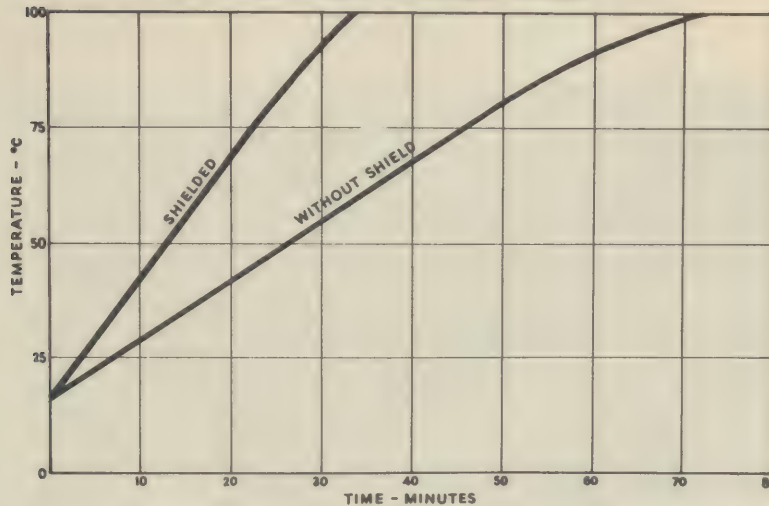


FIG. 2
IMPROVED METHOD

An improved method of heating water is to place the can on iron rods or pipes placed across the fire trench, and surround the can with a metal shield, as shown in Fig. 2. Thus, the entire bottom of the can is exposed to the flames which are also directed against the sides of the can, and less of the surface of the can is left to radiate heat to the surrounding air. The shield not only conserves heat, but acts as a chimney improving the draft, and directs the flames so a person may approach the can without the danger of being burned.

MESS SANITATION

FIG. 3
COMPARATIVE RESULTS OF HEATING 32 GALLONS OF WATER
IN G.I. CAN BY SHIELDED & UNSHIELDED METHODS.



Experiments conducted at Wakeman Field show that the use of a metal shield increases the efficiency of the heating device about 100 per cent. This causes the water to boil in less than half the time, and conserves half the fuel.

Heating water in the field for mess-kit washing, using wood as fuel in a fire trench. Halves of 55-gallon steel drums are being used as shields. The G.I. cans are supported by iron rods or pipes placed across the fire trench.



MESS SANITATION

This elevated fire trench was constructed of clay and the 55-gallon steel drums were cut so as to lie horizontally. Bungs at the bottom of each section allow pipes to be unscrewed and the water to be drained into a rock-pit below.



Other methods of heating are demonstrated in Wakeman Field, but are not pictured here because they are the familiar items of issue. Among these devices are the gasoline field range, model of 1937; the immersion type of water heater for corrugated cans, usually referred to as a "down-draft" heater; the one-burner gasoline cooking stove, M-1941 or M-1942; and the oil burner tent stove, M-1941.

MESS SANITATION



Screened food containers are constructed to exclude insects and other vermin. If a wet canvas or cloth cover is placed over the container, it will serve to cool it by evaporation of the water.

Food containers placed on the ground may be protected from vermin by metal shields or oil-soaked rags tied around the supports.



MESS SANITATION

In the underground ice box, the moist earth produces a cooling effect which may be increased if ice is available.



Field ice boxes should be well insulated if ice is used. If they are placed underground and the coolness of the earth alone is depended upon, insulation would retard heat transfer and so it is contraindicated.



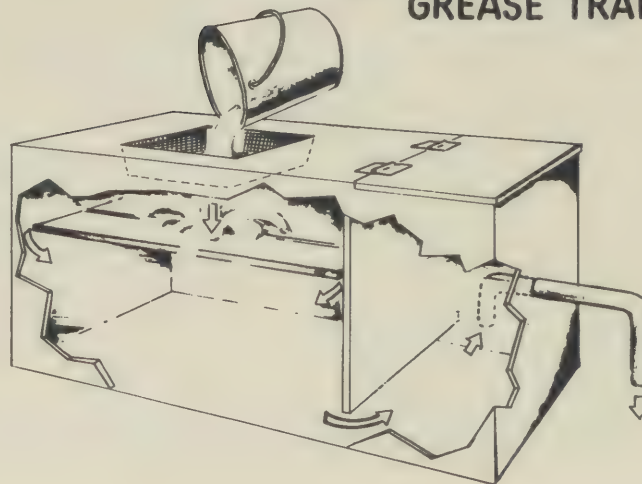
A food storage vault may be fashioned from an existing cave or dug in a convenient location. Loose rock flooring keeps the interior dry.

A garbage stand should be so constructed that it can be cleaned easily.



Liquid kitchen wastes poured into a cold water and baffle grease trap are prevented from surging through the device by a board floating on the surface of the water in the inlet chamber. Grease rises to the surface and displaced water flows under the baffle into the outlet chamber. An elbow directed downward at the origin of the overflow pipe allows the grease which inadvertently reaches the second chamber to layer on the surface of the water.

COLD WATER AND BAFFLE GREASE TRAP

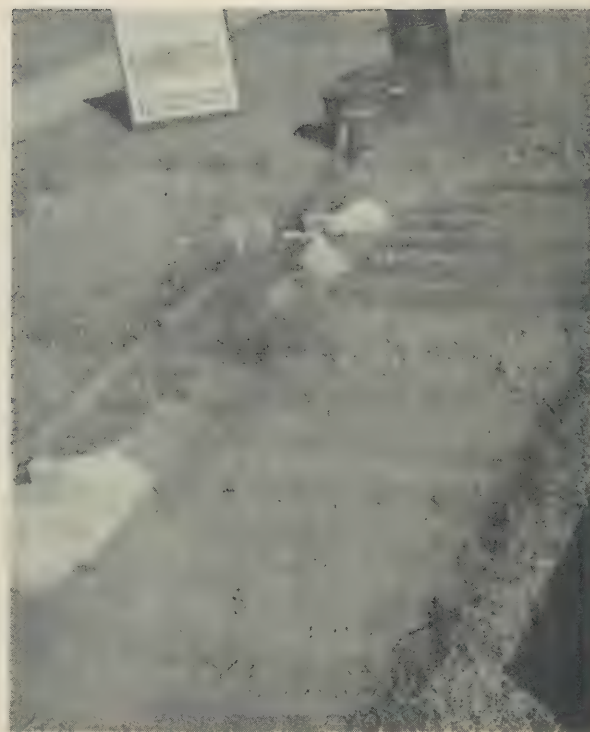


If the baffle grease trap is partially buried, the contained water remains cool. Moreover, one constructed of wood is less apt to dry out on the external surface, thus preventing warping and seepage. The effluent water is delivered to a soakage pit, each of two pits being used on alternate days by shifting the outlet pipe from one to the other.



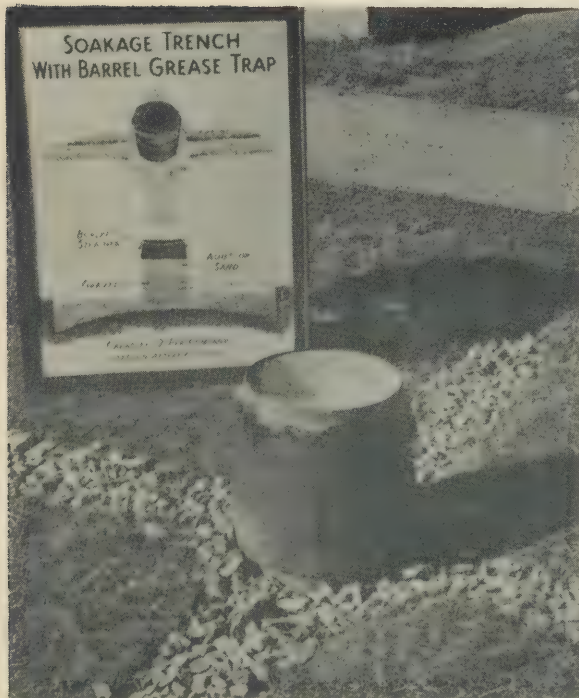
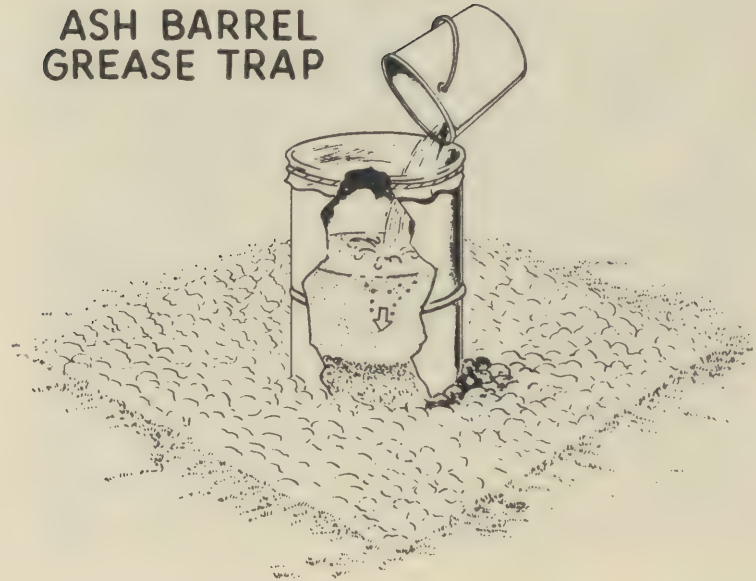
Grease removal from liquid kitchen wastes prolongs the life of the soakage pit. Fats and oils obstruct the pores of the earth, rendering it impervious. Cold water-baffle grease traps may be constructed of salvaged metal, and may be designed with multiple baffles.

In dry climates where the soil is rather impervious, liquid kitchen wastes can be evaporated. A number of beds are prepared so that there can be sufficient rotation to permit thorough drying.



ASH BARREL GREASE TRAP

An ash barrel grease trap may be constructed from any cylindrical object of suitable size with layers of sand, ashes or other contact material, placed over a soakage pit.



Soakage trenches may be used instead of pits, and are particularly useful where the ground water level or rock stratum does not permit deeper excavation.



Garbage and other refuse may be disposed of satisfactorily by deep burial in a pit or trench. The pit or trench should be closed when the contents are within two feet of the surface.

When the garbage pit or trench is closed, it may be necessary to make a layer of stones, logs or branches to exclude rodents and other scavengers. The excavated earth should be domed up and the site marked.



When other methods cannot be used, wet garbage can be evaporated from an improvised drying pan placed over a fire. When sufficiently dry, the residue may be added to the fire. Since the method is cumbersome and inefficient, it is used only when the liquids cannot be separated from the solids and disposed of in other ways.



Incineration of garbage is facilitated by removing the excess water. A garbage strainer may be made so as to fit into a G.I. can, thus allowing the liquids to collect in the can and the solids to be retained in the strainer.

MESS SANITATION



In camps of more than a week, and when burial is impractical, garbage may be incinerated. This is an overall view of a section of Wakeman Field, showing various garbage incinerators.

One of the simplest incinerators can be made from a salvaged 55-gallon steel drum by removing both ends of the drum, and perforating the lower third of it with a pick. Wet garbage may be burned by using alternate layers of garbage and wood. Ash removal is simplified by merely shifting the drum. Ordinarily, this device will destroy the kitchen wastes of a company.



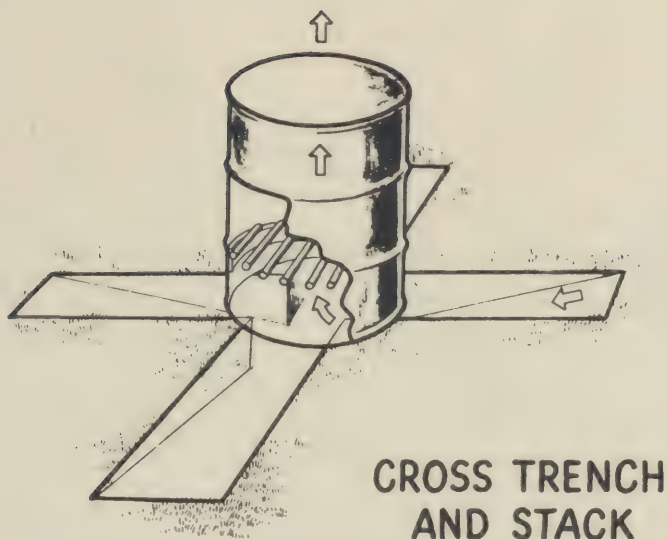
MESS SANITATION

A similar incinerator can be improvised from a 55-gallon steel drum by leaving the bottom intact but perforating it and the lower third of the drum with a pick. The device can be elevated on stones to improve the draft.



Tin-cans filled with earth may also be used to improvise an incinerator. It is advantageous to place a grate on the first tier of cans, and leave an opening or two below it for a draft.

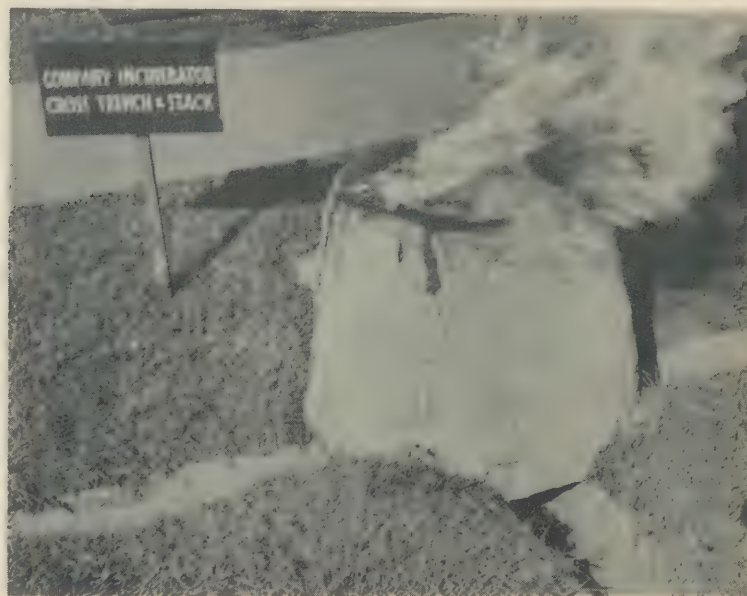
MESS SANITATION



CROSS TRENCH
AND STACK

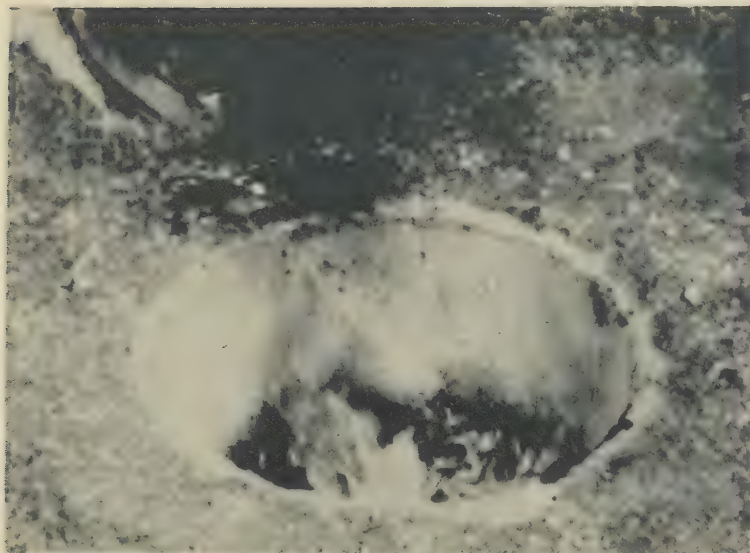
This diagram illustrates the type of incinerator originally used to dispose of both liquid and solid kitchen wastes. A wood fire was made in the intersection of the trenches, and wastes and fuel added through the stack. Liquids either leached away in the trenches or were evaporated.

Now the cross trench and stack incinerator is used to destroy only solid kitchen wastes. The fire is made on top of the grates, and the trenches provide the draft and serve as an ash pit. The stack may be made from a salvaged 55-gallon steel drum, concrete, stone, brick, clay, or other material.



MESS SANITATION

Construction of this type of incinerator is laborious. The operation of it must be intermittent to allow the ashes to be removed. During wet weather, water puddles in it. An open bonfire is almost as effective.



The draft pit incinerator is operated by using alternate layers of garbage and wood, after a small fire has been started.



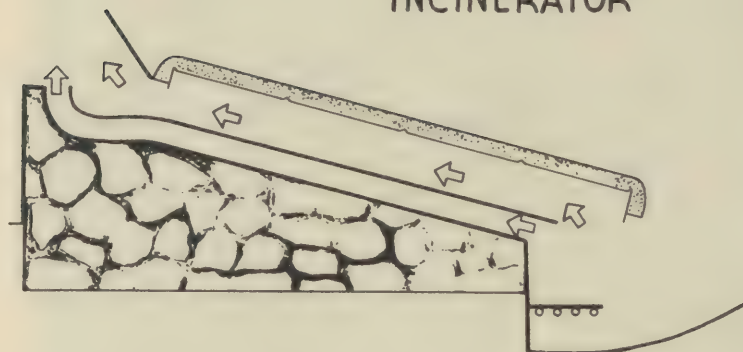
A satisfactory incinerator can be made from sod. In this device, two old buckets with the bottoms removed serve as draft ports, and iron rods are laid just above them to serve as a grate.

The regimental rock-pile incinerator was originally used to destroy both liquid and solid kitchen wastes. Now only solid wastes are destroyed in it. It has but few advantages over an ordinary bonfire and uses a great deal of fuel in comparison to the amount of waste destroyed.



A fire is laid on the grate below the inclined plane. Wet garbage or other waste is placed on the upper end of the plane and gradually worked down onto the fire. Heat passing over and under the plane dries the waste so that it is combustible by the time it falls onto the fire.

INCLINED PLANE INCINERATOR



Earth packed about the inclined plane incinerator increases its efficiency considerably. It is affected little by wind or by precipitation. Ordinarily, this device will destroy the wastes of a batallion.



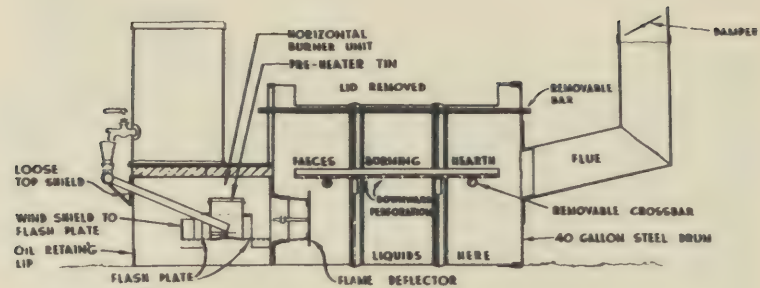
Various devices using the oil-water flash burner are exhibited in Wakeman Field. Here, a burner unit is shown in which waste oil and water are dropped simultaneously on a hot metal plate. The oil burns more completely because steam disperses it into tiny droplets.

This vertical type incinerator is used to destroy small amounts of waste, such as soiled dressings. It is somewhat complicated and not very efficient because it is not insulated. Addition of waste is difficult because the stack becomes too hot to handle.



MESS SANITATION

This horizontal type of oil-water flash incinerator is made from a salvaged steel drum. It is somewhat difficult to make and to operate.



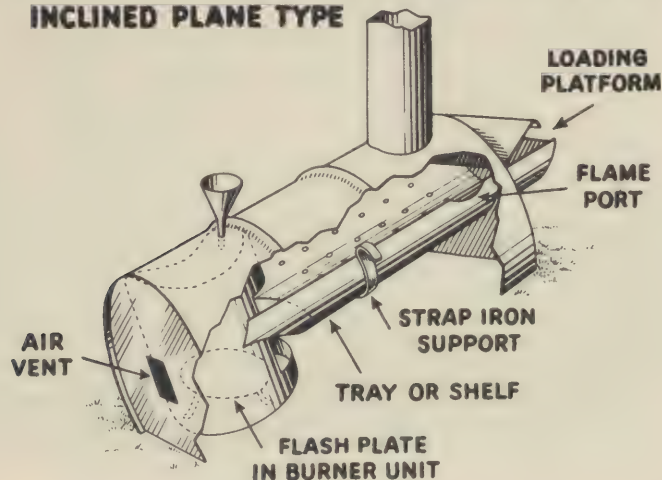
Reference: Journal Royal Army Medical Corps, 81: 86-88 (Aug.) 1943.



The horizontal type of oil-water flash incinerator is not very efficient because it is difficult to insulate.

OIL-WATER FLASH INCINERATOR

INCLINED PLANE TYPE



An inclined plane type of oil-water flash incinerator can be improvised from a 55-gallon steel drum, cut horizontally so that one-third of it is made into a tray. This portion is inserted through an elliptical slot made in one end of the remaining two-thirds of the drum, thus forming an inclined shelf.

The burner unit is made from a 5-gallon pail and fastened within the lower third of the drum. Oil and water reservoirs are supported above the device and the oil-water mixture is delivered through a funnel directly above the flash plate. Ashes accumulate on the ground under the lower end of the drum and can be removed as necessary by slipping a shovel under the end of the drum. The device is relatively simple to construct and operate, and it is quite efficient because it can be well insulated with earth.



At Wakeman Field, fly control is demonstrated by the use of various types of fly traps and insecticides. Here 5 per cent DDT in kerosene is being applied as a residual spray.



Disposal of human wastes is demonstrated by use of the simplest method, as well as by the use of more complicated methods.

HUMAN WASTES



Privacy in the latrine is usually afforded by canvas screens, but lacking these a brush screen may be improvised.

In camps of less than a week, a straddle trench latrine is dug. Each trench is about 1 foot wide, 4 feet long and 2½ feet deep. Four such trenches will accommodate a unit of 100 men. Toilet tissue protected by tin-cans, loose earth for coverage of each deposit, and a hand-washing device are essentials.



A hand-washing device is an essential part of every latrine. A simple one may be improvised from salvaged tin-cans.



The 5-gallon water can may be suspended and used as a hand-washing device.

HUMAN WASTES



The deep pit latrine intended for installations of more than a week's duration must be made fly-proof. An excavation 6 inches deep extending 4 feet about the pit is made first. Burlap soaked with waste motor oil is then spread over the surface and allowed to hang into the pit a distance of 18 inches. A latrine box is next placed in position and the dirt is replaced and tamped.

Para-dichlorobenzene and other fumigants can be used for fly control in the pit. Fly traps in the vicinity and use of DDT residual sprays are essential during the breeding seasons. The latrine may be provided with canvas shelter, illumination, heat, mosquito netting, etc. for the comfort of the users. A hand-washing device is necessary.



If it is impossible to dig a deep pit latrine because of a high water table or rocky ground, a mound of earth may be formed—preferably by power equipment—and used about the deep pit. It is usually necessary to reinforce the pit with wood timbers to prevent it from caving in.



Drums made from halves of 55-gallon steel barrels may be used as latrines. A box provided with four seats may be used, and then removed when it becomes necessary to burn out the drums or otherwise dispose of the waste.



Pail latrines are convenient in places where pits cannot be dug. Here one is shown as it might be installed inside a building, and adapted so that the pails may be removed from the outside. The method is not without hazard for the attendant, and therefore a latrine bucket disinfectant must be used routinely.

Contents from a pail latrine may be disposed of in a sewer if available, or in an Otway pit. The latter is essentially a cesspool which is fly-proof. A fly trap is placed over the vent.



Incinerators for feces are sometimes used when other methods cannot be employed. Of several designs is a vertical type feces incinerator, shown with multiple shelves and a wood fire.



Another type of feces incinerator consists of a 55-gallon steel drum with both ends removed and set on an iron grate. If one end of the drum is left intact, it may be punched with pick holes and serve as the grate. Wood for a fire is arranged on the grate, and a fly-proof seat is placed on top of the drum. Solid wastes are retained by the fire wood and allowed to dry, while the liquid wastes percolate into the ground. A screen should be molded about the draft opening to exclude flies. periodically, the seat is removed to another similar device, and the drum is burned out.



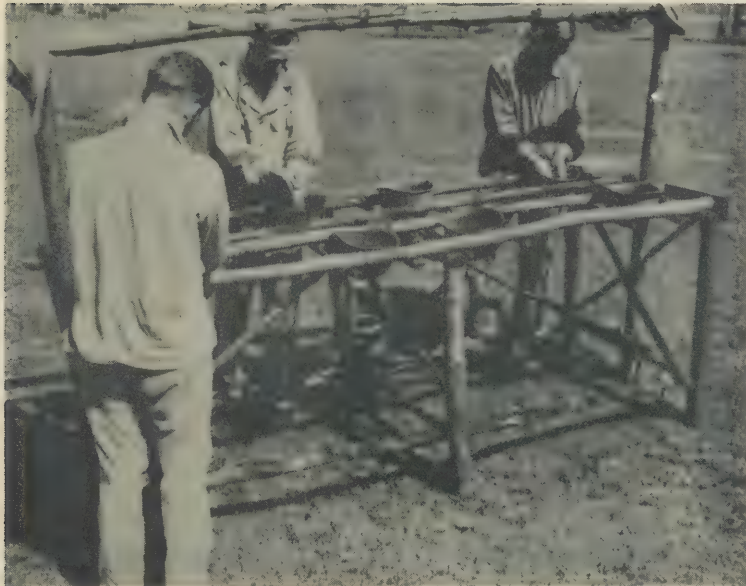
A bored hole latrine can be dug with an earth auger which is equipment of the engineer regiment. The hole is about 16 inches in diameter and should be 15 or more feet in depth. No fly-proofing is required other than a latrine box which will exclude flies.

Salvaged cans may be used as portable latrines. An open can or one with a funnel-shaped opening makes a satisfactory urinal, the so-called "desert lily". An improvised seat converts another into the "desert rose".



HUMAN WASTES

A urine soakage pit is necessary only if the deep pit latrine is located in soil so impervious that the liquid wastes do not leach away.



Various types of ablution benches may be improvised in the field. This one is made of wood poles, and helmets are used as wash basins.

ANIMAL WASTES



At a permanent camp or station, animal wastes are usually disposed of by composting for a few weeks or months, and then using the matter as fertilizer. Fly-breeding must be controlled, but this is possible if the composting is done properly. An area is cleared, oiled, and tightly packed. A ditch is dug 2 feet inside the perimeter and kept partly filled with oil. Manure is added in sections and kept moist so that the heat generated during disintegration is sufficient to kill fly larvae.

Another method of composting manure is shown at Wakeman Field. The animal waste is covered with a clay poultice made from earth excavated along the edge of the pile. One end is left open so that the pile may be extended.



ANIMAL WASTES

Animal wastes may be stored temporarily in a manure bin adjacent to the stable. It is necessary that the bin be fly-proof and that the manure be removed frequently to the compost pile.



Manure piled on the ground and allowed to dry 3 or 4 days will burn without the addition of oil or other fuel. Windrows are used when there is insufficient time to compost the manure and utilize it as fertilizer.

ANIMAL WASTES



In temporary camps or on bivouacs, fresh manure can be burned by the addition of oil or other fuel. Wood may be used if the manure is piled on a grid above the fire.

Animal wastes which are properly dried will not breed flies. Drying manure is not a satisfactory method of disposal in regions where there is much precipitation.



To avoid fly-breeding, carcasses may be rolled onto logs placed across a fire trench and then incinerated. Any remains can be buried with the ashes when the trench is covered.



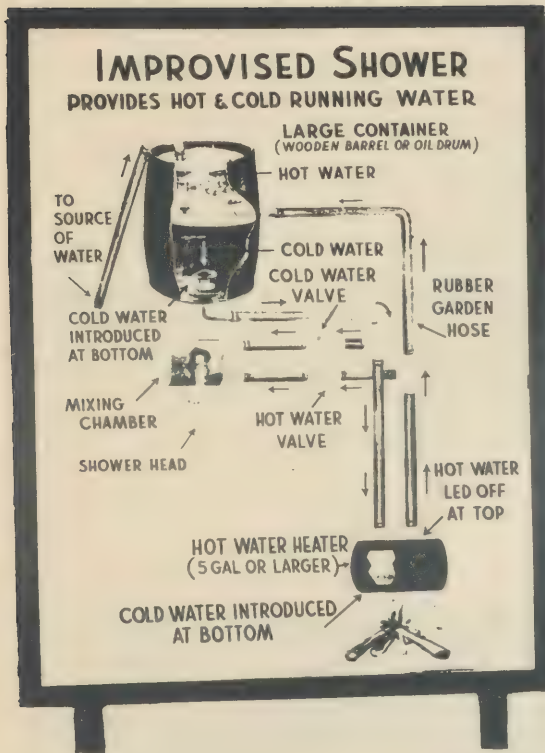
Another method to incinerate a carcass is to place it on a grid above cross-trenches in which a wood fire is kindled.



Among the devices for personal hygiene demonstrated at Wakeman Field is an improvised shower made from a G.I. can, fitted with a shower head and cut-off valve, and elevated on a scaffolding.

Field showers may be improvised from other salvaged materials, and filled by a comrade with water of just the right temperature.





Water may be heated for hand-washing and shaving in this device by means of a wood fire. The cold water is poured in, entering the drum near the bottom which displaces the hot water upward, and the warm water is then drawn off near the top. One procures only as much hot water as is displaced by the water added.





Delousing in the field used to be a rather formidable procedure. The Serbian barrel was a common method for disinfestation using steam. The method may be resorted to if chemical insecticides are not available.

Delousing with insecticide powders is quite revolutionary. Here the use of the individual can and the hand duster are being demonstrated. The use of methyl bromide in the gas-proof delousing bag is also demonstrated.



PERSONAL HYGIENE

Many variations of mechanical laundries have been improvised, depending upon the salvaged materials available. This one, a horizontal rocking type, is powered by a motor vehicle.



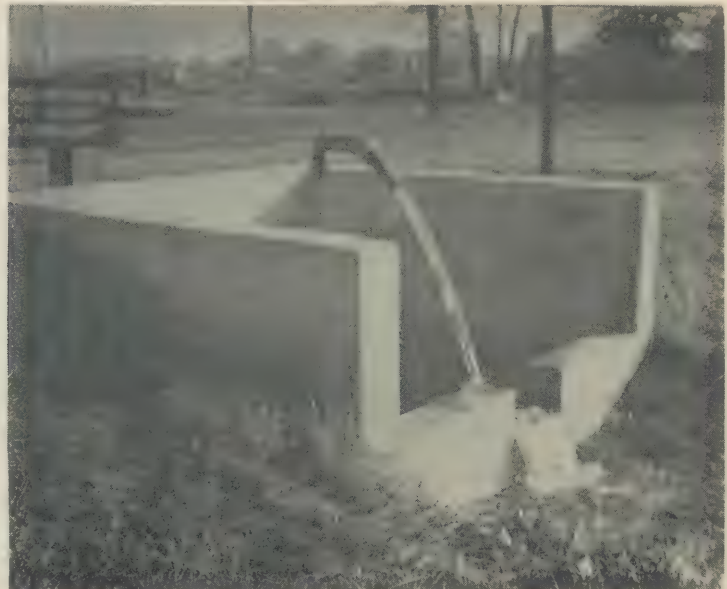
Clothes wringers of various types have been devised for use in the field. Here a "nut-cracker" type is shown. It is attached to the "laundry tub" which is being heated by a wood fire in the cross trenches.

WATER SUPPLY



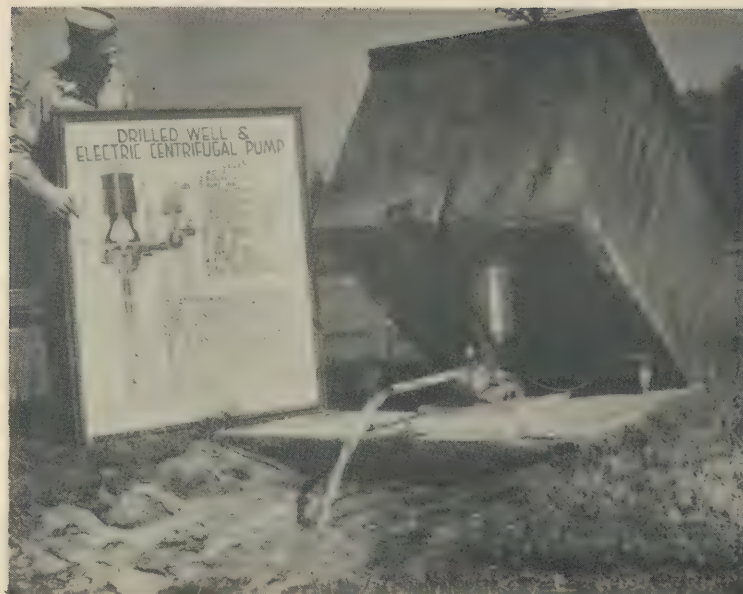
In Wakeman Field, methods of obtaining and purifying water are shown. A cross-section of a well and hand pump illustrates proper construction for protection of a shallow well from surface pollution.

Water from the public supply is used to demonstrate the protection of water sources, prevention of cross-connections, flow measurements, etc.



WATER SUPPLY

A deep well and electric pump illustrate another method for the proper procurement of ground water.



Protection of natural springs to prevent surface contamination is also shown.

WATER SUPPLY



A model showing a cross-section of the ground is used to show sub-surface pollution.

Water sterilized by boiling can be stored in another drum at a lower level. It should be chlorinated when cool before it is used for drinking purposes.



WATER SUPPLY

An engineer's water purification unit is used to obtain drinking water. Here the water is being pumped into a 250-gallon trailer.



The same unit is set up in the bivouac area to procure water for the camp.



Methods of chemically sterilizing water are demonstrated and then carried out by the classes.

Methods of testing water in the field are likewise demonstrated and applied.



INSECT AND RODENT CONTROL

Methods of estimating adult Anopheline densities are shown using artificial shelters from which the mosquitoes are collected.



Around human habitations, particularly in war-torn areas, many collections of water are found which encourage the breeding of disease-bearing mosquitoes. In this demonstration students are shown some of the sites in which immature stages of the insects are found.

INSECT AND RODENT CONTROL



The swamp, dam, and pond under construction.

The dam and pond, landscaped. This area is used not only as a water source, but also to show the control of mosquitoes and other insects which are pests and vectors of disease.



The stream flowing into the swam and pond is used for demonstrating mosquito control.



Various types of surface and sub-surface ditches illustrate means of draining swamps. In the distance are bleachers used by students as a vantage point for instruction in malaria control.

INSECT AND RODENT CONTROL



Protection in the jungle is illustrated by correct wearing of clothing, head nets, gloves and repellents. The use of a mosquito-proof hammock in a foxhole is shown.

The correct use of mosquito bars inside the "pup" tent and about the bed is demonstrated.



The pump house contains a circulating pump which is used to force water from the pond back to the model of a protected spring. It is also used to illustrate correct ways of using screens.



Equipment used in mosquito control is demonstrated to the class, and then put into actual use in the swamp behind the instructor.

INSECT AND RODENT CONTROL



Mosquito control in the swamp using paris green in a duster.

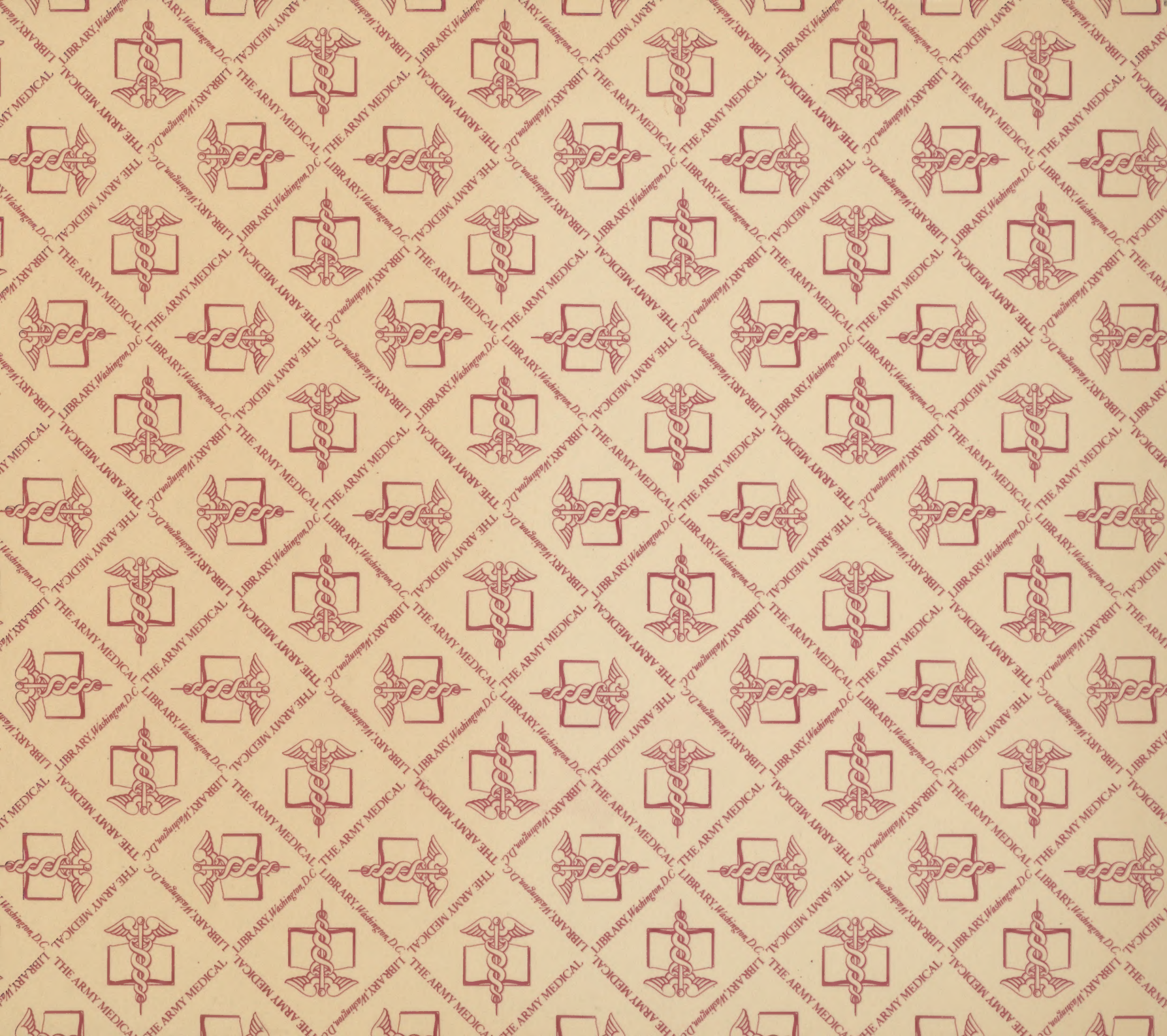
When there is mosquito breeding along a running stream, some continuous method of applying larvicide produces better control.



A section of a temporary building is used to illustrate both the proper and the improper means of rat-proofing a building. Models are used to demonstrate methods of rat-exclusion, rat traps, poisons, and other methods of rodent control.



Calcium cyanide and a foot pump are used in a rat burrow.



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